

SEQUENCE LISTING

<110> Toyota Jidosha Kabushiki Kaisha

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<120> Method of controlling Ethanol production

<130> PCTJP20007 (TSN2002-299-WO-00)

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<150> JP2002-65880

<151> 2002-03-11

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<160> 39

<170> PatentIn Ver. 2.1

20

<210> 1

<211> 332

<212> PRT

25

<213> Bovine

<400> 1

Met Ala Thr Leu Lys Asp Gln Leu Ile Gln Asn Leu Leu Lys Glu Glu

5      1                      5                      10                      15

His Val Pro Gln Asn Lys Ile Thr Ile Val Gly Val Gly Ala Val Gly

20                      25                      30

10 Met Ala Cys Ala Ile Ser Ile Leu Met Lys Asp Leu Ala Asp Glu Val

35                      40                      45

Ala Leu Val Asp Val Met Glu Asp Lys Leu Lys Gly Glu Met Met Asp

50                      55                      60

15

Leu Gln His Gly Ser Leu Phe Leu Arg Thr Pro Lys Ile Val Ser Gly

65                      70                      75                      80

Lys Asp Tyr Asn Val Thr Ala Asn Ser Arg Leu Val Ile Ile Thr Ala

20                      85                      90                      95

Gly Ala Arg Gln Gln Glu Gly Glu Ser Arg Leu Asn Leu Val Gln Arg

100                      105                      110

25 Asn Val Asn Ile Phe Lys Phe Ile Ile Pro Asn Ile Val Lys Tyr Ser

115                      120                      125

Pro Asn Cys Lys Leu Leu Val Val Ser Asn Pro Val Asp Ile Leu Thr

130                      135                      140

Tyr Val Ala Trp Lys Ile Ser Gly Phe Pro Lys Asn Arg Val Ile Gly  
 145 150 155 160

5 Ser Gly Cys Asn Leu Asp Ser Ala Arg Phe Arg Tyr Leu Met Gly Glu  
 165 170 175

Arg Leu Gly Val His Pro Leu Ser Cys His Gly Trp Ile Leu Gly Glu  
 180 185 190

10 His Gly Asp Ser Ser Val Pro Val Trp Ser Gly Val Asn Val Ala Gly  
 195 200 205

15 Val Ser Leu Lys Asn Leu His Pro Glu Leu Gly Thr Asp Ala Asp Lys  
 210 215 220

Glu Gln Trp Lys Ala Val His Lys Gln Val Val Asp Ser Ala Tyr Glu  
 225 230 235 240

20 Val Ile Lys Leu Lys Gly Tyr Thr Ser Trp Ala Ile Gly Leu Ser Val  
 245 250 255

Ala Asp Leu Ala Glu Ser Ile Met Lys Asn Leu Arg Arg Val His Pro  
 260 265 270

25 Ile Ser Thr Met Ile Lys Gly Leu Tyr Gly Ile Lys Glu Asp Val Phe  
 275 280 285

Leu Ser Val Pro Cys Ile Leu Gly Gln Asn Gly Ile Ser Asp Val Val

290

295

300

Lys Val Thr Leu Thr His Glu Glu Glu Ala Cys Leu Lys Lys Ser Ala

305

310

315

320

5

Asp Thr Leu Trp Gly Ile Gln Lys Glu Leu Gln Phe

325

330

10 &lt;210&gt; 2

&lt;211&gt; 971

&lt;212&gt; DNA

<213> *Saccharomyces cerevisiae*

15 &lt;400&gt; 2

aagggtagcc tccccataac ataaactcaa taaaatatat agtcttcaac ttgaaaaagg 60

aacaagctca tgcaaagagg tggtagccgc acgccgaaat gcatgcaagt aacctattca 120

aagtaatatc tcatacatgt ttcatgaggg taacaacatg cgactgggtg agcatatgct 180

ccgctgatgt gatgtgcaag ataaacaagc aagacggaaa ctaacttctt cticattgtaa 240

20 taaacacacc ccgcgtttat ttacctatct ttaaacttca acacattata tcataactaa 300

tatttcttga gataagcaca ctgcacccat accttcccta aaagcgtagc ttccagtttt 360

tggtaggttcc ggcttccctc ccgattccgc ccgctaaacg catatttttg ttgcctgggtg 420

gcatttgcaa aatgcataac ctaigcattt aaaagattat gtatgctctt ctgacttttc 480

gtgtgatgaa gctcgtggaa aaaatgaata atttatgaat ttgagaacaa ttctgtgttg 540

25 ttacggtatt tiactatgga ataattaatc aattgaggat ttatgcaaa tatcgtttga 600

atatttttcc gaccctttga gtacttttct tcataattgc ataattttgt ccgctgcccc 660

ttttctgttt agacgggtgc ttgatctact tgctatcggt caacaccacc ttattttcta 720

actatttttt ttttagctca tttgaatcag cttatgggtg tggcacattt ttgcataaac 780

ctagctgtcc tcgttgaaca taggaaaaaa aaatatatta acaaggctct ttactctctc 840

ttgcaatcag atttgggttt gtcccttta tttcatatt tcttgtcata ttcctttctc 900  
aattattatt ttctactcat aaccacacgc aaaataacac agtcaaatca atcaaagatc 960  
ccccaattct c 971

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<210> 3

<211> 999

<212> DNA

<213> Artificial Sequence

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<220>

<223> Description of Artificial Sequence:Modified DNA  
coding lactate dehydrogenase

15 <400> 3

atggctactt tgaaagatca attgattcaa aatttgttga aagaagaaca tgttccacaa 60  
aataaaatta ctattgttgg tgttgggtgct gttgggtatgg cttgtgctat ttctattttg 120  
atgaaagatt tggctgatga agttgctttg gttgatgtta tggaagataa attgaaaggt 180  
gaaatgatgg atttgcaaca tggttctttg tttttgagaa ctccaaaaat tgtttcttgg 240  
aaagattata atgttactgc taattctaga ttggttatta ttactgctgg tgctagacaa 300  
caagaagggt aatctagatt gaatttggtt caaagaaatg ttaatatatt taaatttatt 360  
attccaaata ttgttaaata ttctccaaat tgtaaattgt tggttgtttc taatccagtt 420  
gatattttga cttatgttgc ttggaaaatt tctggttttc caaaaaatag agttattgg 480  
tctggttgta atttggattc tgctagattt agatatttga tgggtgaaag attgggtgtt 540  
catccattgt cttgtcatgg ttggattttg ggtgaacatg gtgattcttc tgttccagtt 600  
tggctctggg ttaatgttgc tgggtgtttct ttgaaaaatt tgcattccaga attgggtact 660  
gatgctgata aagaacaatg gaaagctgtt cataaacaag ttgttgattc tgcttatgaa 720  
gttattaaat tgaaagggtta tacttcttgg gctatttggt tgtctgttgc tgatttggct 780  
gaatctatta tgaaaaattt gagaagagtt catccaattt ctactatgat taaagggtttg 840

tatggatatta aagaagatgt ttttttgict gttccatgta ttttgggtca aaatggatatt 900  
 tctgatgttg ttaaagttac ttgactcat gaagaagaag cttgtttgaa aaaatctgct 960  
 gatactttgt ggggtattca aaaagaattg caattttaa 999

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<210> 4

<211> 1052

<212> DNA

<213> Artificial Sequence

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<220>

<223> Description of Artificial Sequence:Modified DNA  
 coding lactate dehydrogenase

15 <400> 4

acagaattca caatggctac ttigaaagat caattgattc aaaatttggt gaaagaagaa 60  
 catgttccac aaaataaaat tactattggt ggtgttggtg ctgttggtat ggcttgtgct 120  
 atttctatit tgaatgaaaga ttiggtgat gaagttgctt tggttgatgt tatggaagat 180  
 aaattgaaag gtgaaatgat ggatttgcaa catggttctt tgtttttgag aactccaaaa 240  
 attgtttctg gtaaagatta taatgttact gctaattcta gattggttat tattactgct 300  
 ggtgctagac aacaagaagg tgaatctaga ttgaatttg ttcaaagaaa tgtaatat 360  
 tttaaattta ttattccaaa tattgttaaa tattctccaa attgtaaatt gttaggttggt 420  
 tctaattccag ttgatatit gacttaigt gcttggaata tttctgggtt tccaaaaaat 480  
 agagttattg gtcttggtg taatttgat tctgctagat ttagatatit gatgggtgaa 540  
 agattgggtg tcatccatt gtcttgcat ggttggtatt tgggtgaaca tggtgattct 600  
 tctgttccag ttgggtctgg tgttaatgt gctgggtgtt ctttgaaaaa ttgcatcca 660  
 gaattgggtg ctgatgctga taaagaacaa tggaaagctg ttcataaaca agttgttgat 720  
 tctgcttatg aagttattaa attgaaaggt tatacttctt gggctattgg ttgtctgtt 780  
 gctgatttgg ctgaatctat tatgaaaaat ttgagaagag ttcattcaat ttctactatg 840

attaaagggtt tgtatggtat taaagaagat gtttttttgt ctgttccatg ttttttgggt 900  
 caaaatggta ttctgatgt tgtaaaagt actttgactc atgaagaaga agcttgittg 960  
 aaaaaatctg ctgatacttt gtgggggtatt caaaaagaat tgcaatttta ataactcgag 1020  
 ctgggttgaa cacgttgcca aggcctaagt ga 1052

5

<210> 5

<211> 100

<212> DNA

10 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

15 <400> 5

acagaattca caatggctac ttgaaagat caattgattc aaaatttggt gaaagaagaa 60  
 catgttccac aaaataaaat tactattggt ggtgttggtg 100

20 <210> 6

<211> 20

<212> DNA

<213> Artificial Sequence

25 <220>

<223> Description of Artificial Sequence:primer

<400> 6

acagaattca caatggctac 20

<210> 7

<211> 100

5 <212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence:primer

10

<400> 7

atgataacaa ccacaaccac gacaaccata ccgaacacga taaagataaa actactttct 60  
aaaccgacta cttcaacgaa accaactaca ataccttcta 100

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<210> 8

<211> 20

<212> DNA

<213> Artificial Sequence

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<220>

<223> Description of Artificial Sequence:primer

<400> 8

25 atgataacaa ccacaaccac

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<210> 9

<211> 100



<212> DNA

<213> Artificial Sequence

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5 <223> Description of Artificial Sequence:primer

<400> 9

tggttgatgt tatggaagat aaattgaaag gtgaaatgat ggatttgcaa catggttctt 60  
tgtttttgag aactccaaaa attgtttctg gtaaagatta 100

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<210> 10

<211> 20

<212> DNA

15 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

20 <400> 10

tggttgatgt tatggaagat 20

<210> 11

25 <211> 100

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 11

taacaaagac catttctaatt attacaatga cgattaagat ctaaccaata ataattgacga 60

5 ccacgatctg ttgttcttcc acttagatct aacttaaacc 100

<210> 12

<211> 21

10 <212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

15

<400> 12

taacaaagac catttctaatt a 21

20 <210> 13

<211> 100

<212> DNA

<213> Artificial Sequence

25 <220>

<223> Description of Artificial Sequence:primer

<400> 13

tgaatctaga ttgaatttgg ttcaaagaaa tgtaatat tttaaattta ttattcctaaa 60

tattgtttaa tattctccaa attgtaaatt gttggttgtt

100

<210> 14

5 <211> 21

<212> DNA

<213> Artificial Sequence

<220>

10 <223> Description of Artificial Sequence:primer

<400> 14

tgaatctaga ttgaatttgg t

21

15

<210> 15

<211> 100

<212> DNA

<213> Artificial Sequence

20

<220>

<223> Description of Artificial Sequence:primer

<400> 15

25 taacatttaa caaccaacaa agattaggtc aactataaaa ctgaatacaa cgaacctttt 60

aaagaccaaa aggtttttta tctcaataac caagaccaac

100

<210> 16

<211> 21

<212> DNA

<213> Artificial Sequence

5 <220>

<223> Description of Artificial Sequence:primer

<400> 16

taacattttaa caaccaacaa a

21

10

<210> 17

<211> 100

<212> DNA

15 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

20 <400> 17

agagttattg gttctgggtg taatttggat tctgctagat ttagatattt gatgggtgaa 60

agattgggtg ttcattccatt gtcttgcatt ggttggattt 100

25 <210> 18

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 18

5 agagttattg gttctggtt t

21

<210> 19

<211> 100

10 <212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

15

<400> 19

cagaacagta ccaacctaaa acccacttgt accactaaga agacaaggtc aaaccagacc 60

acaattacaa cgaccacaaa gaaacttttt aaacgtaggt 100

20

<210> 20

<211> 21

<212> DNA

<213> Artificial Sequence

25

<220>

<223> Description of Artificial Sequence:primer

<400> 20

cagaacagta ccaaccta aa a

21

<210> 21

5 <211> 100

<212> DNA

<213> Artificial Sequence

<220>

10 <223> Description of Artificial Sequence:primer

<400> 21

ctttgaaaaa ttgcatcca gaattgggta ctgatgctga taaagaacaa tggaaagctg 60

ttcataaaca agttgttgat tctgcttatg aagttattaa 100

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<210> 22

<211> 21

<212> DNA

20 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

25 <400> 22

ctttgaaaaa ttgcatcca g

21

<210> 23

<211> 100

<212> DNA

<213> Artificial Sequence

5 <220>

<223> Description of Artificial Sequence:primer

<400> 23

agacgaatac ttcaataatt taactttcca atatgaagaa cccgataacc aaacagacaa 60

10 cgactaaacc gacttagata atacttttta aactcttctc 100

<210> 24

<211> 21

15 <212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

20

<400> 24

agacgaatac ttcaataatt t 21

25 <210> 25

<211> 100

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 25

5   tatgaaaaat ttgagaagag ttcattccaat ttctactatg attaaagggt tgtatggat 60  
taaagaagat gttttttgt ctgttccatg tattttgggt 100

<210> 26

10   <211> 20

<212> DNA

<213> Artificial Sequence

<220>

15   <223> Description of Artificial Sequence:primer

<400> 26

atgaaaaatt tgagaagagt 20

20

<210> 27

<211> 100

<212> DNA

<213> Artificial Sequence

25

<220>

<223> Description of Artificial Sequence:primer

<400> 27



gacaaggtac ataaaaccca gttttaccat aaagactaca acaatttcaa tgaaactgag 60  
tacttcttct tcgaacaaac ttttttagac gactatgaaa 100

5 <210> 28  
<211> 21  
<212> DNA  
<213> Artificial Sequence

10 <220>  
<223> Description of Artificial Sequence:primer

<400> 28  
gacaaggtac ataaaaccca g 21

15

<210> 29  
<211> 60  
<212> DNA

20 <213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:primer

25 <400> 29  
aaaaaatctg ctgatacttt gtgggggtatt caaaaagaat tgcaatttta ataactcgag 60

<210> 30

<211> 21

<212> DNA

<213> Artificial Sequence

5 <220>

<223> Description of Artificial Sequence:primer

<400> 30

aaaaaaatctg ctgatacttt g

21

10

<210> 31

<211> 52

<212> DNA

15 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

20 <400> 31

acgttaaaat tattgagctc gaaccaactt gtgcaacggt tccgaattca ct

52

<210> 32

25 <211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 32

acgttaaaat tattgagctc g

21

5

<210> 33

<211> 31

<212> DNA

10 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

15 <400> 33

atataatggat ccgcgtttat ttacctatct c

31

<210> 34

20 <211> 31

<212> DNA

<213> Artificial Sequence

<220>

25 <223> Description of Artificial Sequence:primer

<400> 34

atataatgaat tctttgattg atttgactgt g

31

<210> 35

<211> 34

<212> DNA

5 <213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

10 <400> 35

atatactctg aggccagcta acttcttggg cgac

34

<210> 36

15 <211> 31

<212> DNA

<213> Artificial Sequence

<220>

20 <223> Description of Artificial Sequence:primer

<400> 36

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31

25

<210> 37

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

5 <400> 37

tggttgatgt tatggaagat

20

<210> 38

10 <211> 21

<212> DNA

<213> Artificial Sequence

<220>

15 <223> Description of Artificial Sequence:primer

<400> 38

gacaaggtac ataaaaccca g

21

20

<210> 39

<211> 19

<212> DNA

<213> Artificial Sequence

25

<220>

<223> Description of Artificial Sequence:primer

<400> 39

gtaataaaca caccgccg

19

5